Ref #109

6.69

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY

FOREST INSECT INVESTIGATIONS

REPORT ON SOME INSECT INFESTATIONS WITHIN HOLDINGS OF THE CLEARWATER TIMBER COMPANY

By R. E. Balch, Agent,
Bureau of Entomology, Coeur d'Alene, Idaho

October 26, 1929

U. S. GOVERNMENT PRINTING OFFICE: 1928 J 76133

CONTENTS

	Page
INTRODUCTION	1
THE SPRUCE BUDWORM	2
THE WESTERN PINE BEETLE	4
THE MOUNTAIN PINE BEETLE	6
THE DOUGLAS FIR BEETLE	8
APPENDIX	

REPORT ON SOME INSECT INFESTATIONS WITHIN HOLDINGS OF THE CLEARWATER TIMBER COMPANY

By R. E. Balch, Agent
Bureau of Entomology, Coeur d'Alene, Idaho

INTRODUCTION

October 10, 11 and 12 were spent in the neighborhood of Orofino, Idaho, examining certain areas owned by the Clearwater Timber Company. Mr. Pohl, whom I met at Weippe, requested that I look at an infestation of spruce budworm (Cacoecia fumiferana Clem.) which was causing the company some concern. While doing this I noted some other insect conditions that are worthy of report.

I should like to express appreciation of the courtesy and assistance of Mr. Albert Curtis, who accompanied me. His ability to "cover the ground" enabled us to see a good deal in the time at our disposal.

Brief accounts of the life histories of the species concerned, with a few illustrations, are added. It is thought they may be of interest to officers of the company. Some such information was requested by Mr. Curtis to enable him to recognize insect activity for purposes of forest protection.

THE SPRUCE BUDWORM

Areas Attacked

Two areas were visited where the budworm was epidemic: The River Trail from Slocum's and the Bull Axe Trail from Headquarters. Conditions were about the same at both points and I believe the infestation will be found throughout most of the white fir stands in these general areas. It seemed to have centered wherever the white fir (Abies grandis) was a prominent feature of the stand.

Damage Done

The insect has been feeding in large numbers for two seasons. Although some feeding may have taken place in 1927 it was comparatively light and the 1927 foliage is little damaged. The epidemic has not been severe enough to force the caterpillars to eat the old foliage, except on occasional trees and toward the upper part of the crown.

The trees are not killed, nor are they likely to die unless the feeding continues next year. The large majority of them, however, have had their leaders killed by the concentrated feeding which always occurs in the top of the crown. In many cases the top of the crown for several feet will die, as well as many buds on the ends of the lower branches. The result will be defective trees with not only loss of increment and abnormal twig development, but with decay entering at the crooks formed where the leader has died. Such trees would be better dead from the point of view of the future stand.

Trees Affected

White fir has suffered most heavily and seems to be a preferred host. Red fir (Pseudotsuga taxifolia) however has been fed on almost as heavily, though where unmixed with white fir it has suffered less. White pine, larch, and hemlock are occasionally attacked, but only when mixed with the fir. Injury to these latter species is very light.

Although fir has been attacked where it occurs scattered among white pine, the damage to the trees is greatest where the percentage of white fir is greatest. The severest defoliation has occurred where white fir forms a pure stand -- as on parts of Bull Axe Mountain -- or where it is mixed with red fir only.

Most of the stand affected is reproduction of from ten to thirty years of age, following fire. Where mature trees occur the feeding is heavier on the reproduction than on the large trees.

Status of Epidemic

A comparison of the feeding on this year's and last year's foliage suggests that the insect was less numerous this year. As it was in the hibernating larval stage, which is very difficult to find, no estimate could be made of numbers. The pupal cases had practically all fallen from the tree.

Although such epidemics as these more often seem to continue until a good part of the area is completely defoliated, it may be that this outbreak is less severe and is already on the decline. Such a prophecy cannot be made. Should the insect, however, die out at this stage the

damage done will not be conspicuous, nor will there be any great increase in fire hazard. The quality and increment of the fir stands will nevertheless be considerably reduced. On the other hand an increase in the epidemic would mean the death of a great deal of this reproduction and a serious fire hazard.

An examination during larval activity next July will show how the infestation is progressing.

Recommendations

There is no possibility of control here. Should the trees be killed there will be no question of salvage as they are mostly too small to cut.

THE WESTERN PINE BEETLE

Area Attacked

Along the road west of Weippe is a stand of mature yellow pine which the Clearwater Company is cruising with a view to sale. The pine is large and scattered, with a dense understory of good-sized red and white fir containing some larch and cedar. There is no yellow pine reproduction and a change of type from pine to fir is in progress. Some cedar poles have been made.

Damage

From 6 to 10% of the pine has been killed by the western pine beetle (Dendroctonus brevicomis Lec.) during the last three or four years. The loss has been greatest in the neighborhood of windfalls

and on an old partial burn which occurred seven years ago. The beetle is taking trees throughout the whole stand, however, and there is a steady loss each year which amounts to probably two or three per cent of the volume. Among those attacked this summer were trees containing as much as 5,000 board feet.

This loss of pine trees will probably continue as, with the exception of a very occasional large "bull pine", they are all mature or overmature and susceptible to attack. In other words, the pine will be eliminated and the beetle is hastening the succession toward the fir type.

Recommendations

Trees from which the brood has emerged are not considered worth cutting, owing to the deterioration of the lumber. Those attacked this summer and containing overwintering brood will be fit to cut this winter. If they are taken to the mill before May the beetles will be destroyed before they are able to attack other trees. The sooner this pine is cut the more there will be to cut. A considerable volume will be saved by logging this winter.

THE MOUNTAIN PINE BEETLE

Areas Affected

In the neighborhood of Camp 12 there are indications of what may possibly be the beginning of an outbreak of mountain pine beetle (Dendroctonus monticolae, Hopk.) in white pine. The stand here consists of almost pure, large, second growth white pine and represents as fine a stand of merchantable pine as will be found anywhere.

Evidence of past damage to white pine was found along the Bull Axe Trail and in other places around Headquarters, in the form of groups of dead trees averaging about seven in number, killed some years back. The only trees found killed this year, however, were in the neighborhood of Camp 12.

An old epidemic of considerable severity has taken the greater part of the lodgepole for a mile or two along the road to Slocum's. This must have occurred from five to ten years ago and the epidemic has died out completely, only a very few stray lodgepole being attacked this year.

Possible Damage

Only two small groups of two and three trees attacked this year were found in the Camp 12 area. Both suggested, however, an increase in the beetle population over last year, and Mr. Chris. Hansen, who is marking timber there, said that such groups were quite common.

The stand is being operated here on, I believe, a 37-year cycle, and trees below 17 inches D.B.H. are being left for a future crop. In

other places the diameter limit is 14 inches. Should an epidemic develop a good deal of this reserve timber will be lost as it is very suitable to mountain pine beetle attack. This year's attack, of course, is not very large but it seems quite aggressive and may develop considerably in a few years if not checked.

Recommendations

Although there is by no means any certainty of an impending outbreak the value of this timber warrants some steps being taken now for its protection. I would suggest that a survey of the area be made this fall to determine the extent of this year's attack, and that control be attempted in conjunction with this winter's cutting operation.

All trees with fresh "pitch tubes" and containing brood beneath the bark should be cut and taken to the mill before spring. It was suggested to Mr. Hansen that such trees should be marked regardless of diameter whenever he found them, as they will die in any case. This will combine salvage and control operations and (I believe) the protection afforded will be well worth the cost. If the infested trees are put through the mill before the first of July the beetles will be destroyed but after that date the new generation will begin to emerge from the bark and enter fresh trees.

THE DOUGLAS FIR BEETLE

Areas Affected

The Douglas fir beetle (Dendroctonus pseudotsugae Hopk.) may be found working here and there in isolated trees -- chiefly the larger ones. In the yellow pine stand near Weippe the red fir has been thinned out by single trees or small groups being killed during past years.

On the slopes of the Whiskey Creek drainage, however, a considerable infestation is in progress now. The stand, which is largely red fir, contains many large groups, of from 5 to 30 trees, which have been killed this year. These trees run from 10 to 30 inches in diameter and it looks as though considerable damage may be done.

Recommendations

The only method of control possible is to cut all the infested trees this winter and destroy the brood by peeling the logs or taking them to the mill before spring emergence. I doubt if the value of this timber would support the expense of a control operation. The infestation extends from where the white pine commences in the upper part of the drainage down to the junction of Whiskey and Orofino Creeks.

THE WHITE FIR BEETLE

Wherever white fir of any size occurs the work of this beetle (Xeoptomester subscabar Lec.) can be found. It is easily recognized by the distinct transverse galleries engraved in the surface of the

wood. White fir has been killed in groups of up to 50 trees of all sizes and the beetle appears to prevent white fir stands attaining fully stocked maturity. It is not at present in an epidemic status and is found breeding only in scattered trees.

APPENDIX

Brief descriptions of the insects concerned, their life histories and methods of control.

The Spruce Budworm (Cacoecia fumiferana Clem)

Figure 1 shows the eggs, larvae (caterpillars), pupae (chrysalids), and adult moths. The eggs are light green and flattened, and are laid on the under side of the needles, shingle-like, in double rows. These are laid around the last week in July or the first in August and some ten days later very small caterpillars hatch from them which spend the winter in minute cocoons. The cocoons are spun wherever a small niche can be found for protection, on the limbs and twigs, and are difficult to find. In the spring feeding commences on the bursting buds, later the young or full-grown needles are consumed. The insect prefers the new growth and will migrate in search of it, but when that is finished feeds readily on the old needles. When in large numbers it completely strips the trees. The caterpillars are mostly brownish in color but often, especially in the earlier stages, tinged with green or red. The head is dark brown to black with a small shield of similar color immediately behind it on the upper side.

In July they turn into dark brown pupae which may be seen among the webs on the twigs. (Fig. 2). From these, around the end of the month, the moths emerge and shortly begin laying the eggs of the next generation. The moths are brownish or greyish, patterned as shown in Fig. 1.

The budworm attacks many species of coniferous trees but prefers red and white fir. Recently, however, it has been found defoliating pure lodgepole stands over a very large area. These are the only three

species in the West which it has seriously damaged so far. There is a possibility, however, that it may be able to develop a liking for other species. (Fig. 3).

Control is difficult and expensive. Dusting or spraying with arsenical poisons are the only methods so far tried and they have not been proved completely satisfactory.

The Western Pine Beetle (Dendroctonus brevicomis Lec.)

This is a small black or brown beetle (Fig. 4) which tunnels beneath the bark of yellow pine. The characteristic pattern of these tunnels, by which its work can be most easily recognized, is shown in Figure 5. Eggs are laid along the sides of the tunnels from which very small white grubs are hatched. Each of these mines a small gallery of its own into the inner bark. Finally when full-grown it pupates within the bark and from the pupa the adult beetle emerges. (See grub and pupa in Fig. 4). Later the beetle bores its way to the surface and flies to attack another tree.

There are two generations a year but these overlap considerably. In general two lots of trees are attacked each year, the brood of the second attack spending the winter as eggs and larvae, completing their development in the spring and emerging early in the summer.

Attacks are first recognized by pitch and boring dust coming from the entrance holes. Later the foliage turns yellow and finally red. By the time the needles are fading the brood is approaching maturity and when they are red emergence has generally taken place.

Artificial control means burning or otherwise destroying the bark of all infested trees during the winter season.

The Mountain Pine Beetle (Dendroctonus monticolae Hopk.)

This is a barkbeetle similar in appearance to the western pine beetle, but somewhat larger. It attacks the yellow, white, and lodgepole pines, as well as sugar pine, limber pine, white-barked pine, and Engelmann spruce. The galleries run straight up the trunk beneath the bark, commencing with a characteristic crook as seen on the left of Figure 6. The grubs, or larvae, mine the bark at the surface of the wood and their characteristic tunnels and pupal cells can be seen on removing the bark from an old attack, as in Figure 6.

This beetle has only one generation a year -- although there may be occasional variations in this. The adults emerge from the tree around the end of July and fly more or less directly to fresh victims. These can be recognized by the tubes of pitch at the entrance holes (Fig. 7). In the case of white pine the foliage generally commences to fade in the fall, while lodgepole more often remains green until spring. By the time the new adults are ready to emerge the needles are almost red.

The only method of control found satisfactory up to the present time is to burn the infested trees before July, or strip the bark and

expose it. The same purpose is served by sending the logs to the mill but care must be taken to destroy or expose the inner side of the bark. At the same time cull logs, stumps, and large tops containing brood must be burned or peeled.

The spotting of trees for control should be done by men with some experience in barkbeetle work.

Douglas Fir Beetle (Dendroctonus pseudotsugae Hopk.)

This beetle is similar in appearance to the mountain pine beetle but often has reddish wing covers and is somewhat more hairy. It attacks Douglas (red) fir, and sometimes western larch. The galleries run straight up the trunk but are shorter than those of the previous species. The larval mines are closer together and spread out fanwise as they enlarge. They are excavated in the bark right at the surface of the wood (Fig. 8).

There is one generation per year. Control is the same as for the mountain pine beetle.

White Fir Beetle (Xeoptormator subcenber Lec.)

This is a smaller barkbeetle attacking white (or grand) fir. The galleries branch across the grain in opposite directions from the entrance hole as shown in Figure 9. They are mined partly in the wood and are easily recognized on the dead trees for many years.

The adult is about 1/6 of an inch in length and may be recognized by the way the posterior end is "scooped out" beneath.

Control is the same as for the preceding species.

October 26, 1929

Acknowledgment

The photographs in this report were taken by Mr. H. J. Rust with the exception of No. 3 which was taken by Mr. J. C. Evenden.

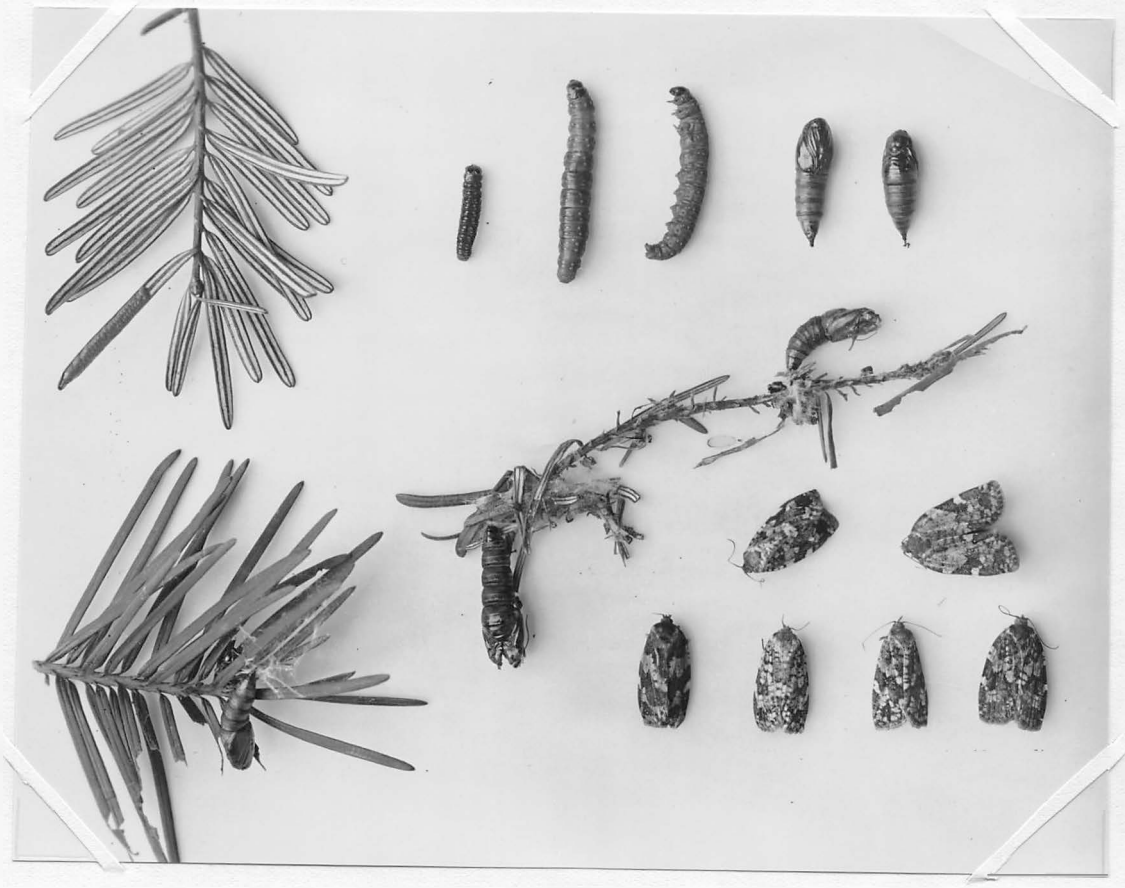

Figure 1

Spruce budworm. Shows eggs on under side of needle; half-grown and mature larvae; pupae, pupal cases, attached to twig, after emergence; adult moths.

Figure 2.
Spruce budworm. Pupae among webs. Excrement of larva in upper right-hand corner held by web which it spins while feeding.

Figure 3.
Spruce budworm.
Douglas fir defoliated and killed by budworm in Yellowstone Park.

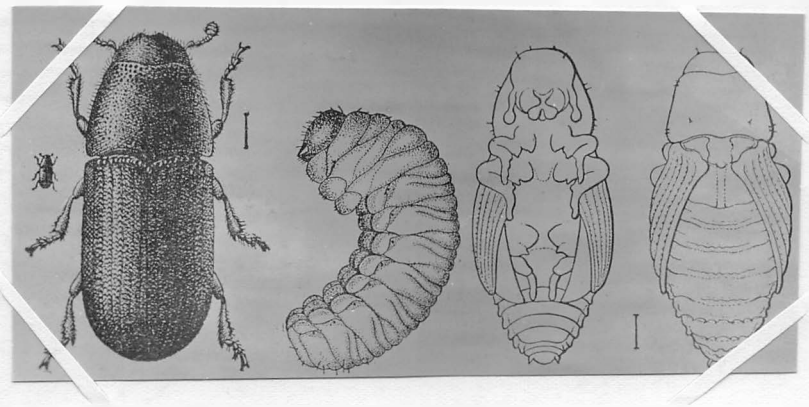

Figure 4
Western Pine Beetle: Adult, larva, and pupa.

Figure 5.
Western Pine Beetle. Inner side of bark removed from yellow pine killed by this beetle. Shows characteristic pattern of galleries made by adult. Larval mines and pupal chambers are within bark.

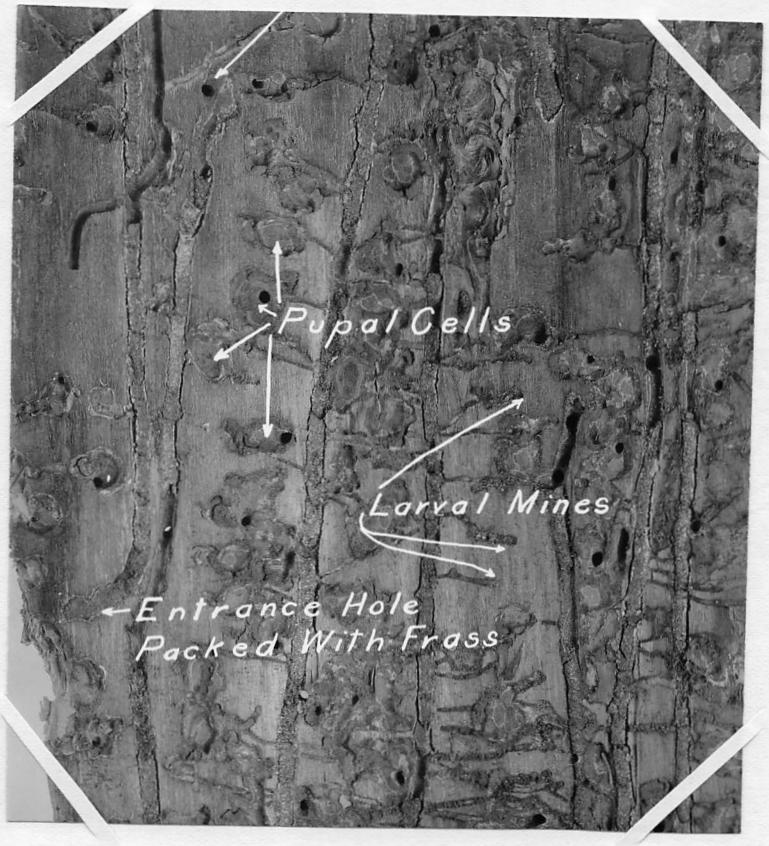

Figure 6.
Mountain Pine Beetle: Inner side of bark removed from pine killed by this beetle. Shows straight galleries of adults with characteristic crook at entrance. Larval mines of this species exposed and not within bark.

Figure 7.
Mountain Pine Beetle: "Pitch tubes" which form on bark at entrance holes. Best indications of attack before foliage fades.

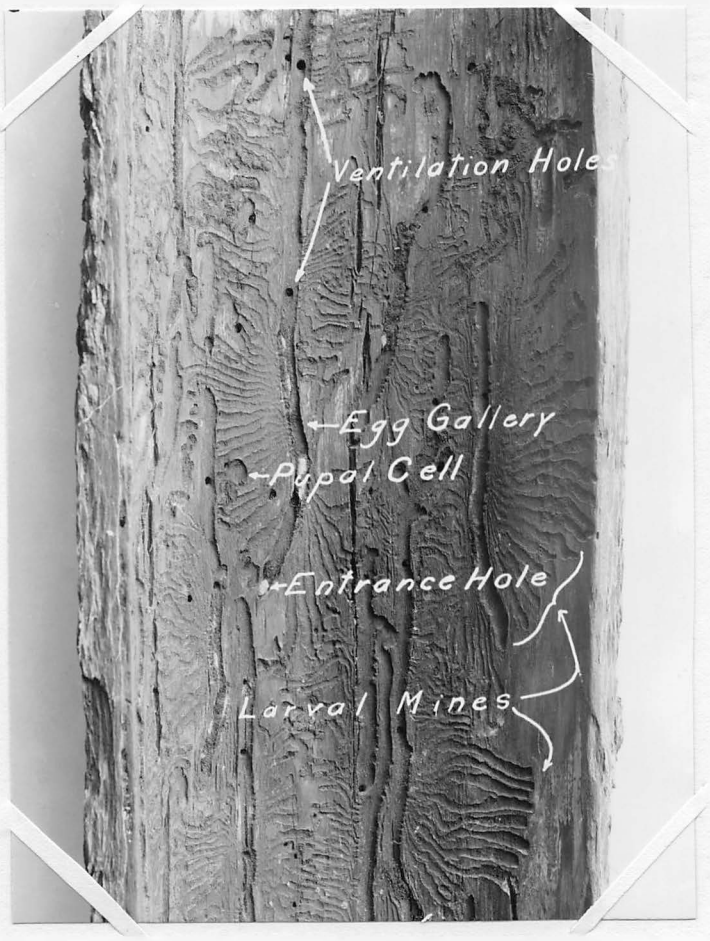

Figure 8.
Douglas Fir Beetle: Inner side of bark removed from Douglas fir killed by this insect. Note fanwise arrangement of exposed larval mines.

Figure 9.
White Fir Beetle: Inner side of bark removed from white fir killed by white fir beetle. Note entrance holes in centre of galleries which run at right angles to axis of bole. Larval mines up and down the tree.